Applying the Design Structure Matrix (DSM) Technique to NASA Organizational Design

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Objectives and Content

ORGANIZATION DISCIPLINE TEAM

Objectives:

- 1. Introduce Design Structure Matrix (DSM) methodology
- 2. Present a Practical Application of DSM in Organization Design

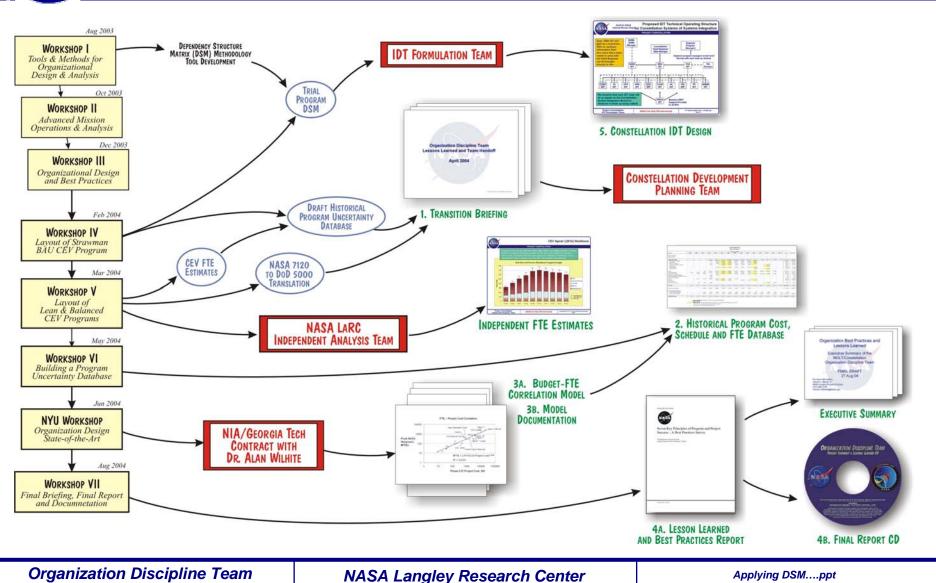
Content:

- 1. Background of the Organization Discipline Team
- 2. Introduction to Design Structure Matrix Methodology
- 3. Formulation of Integrated Discipline Teams (IDTs) for Constellation Systems



Background: Organization Discipline Team FY03-04 Activity

Applying DSM....ppt Page 3





Introduction to DSM

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- Uses of the Design Structure Matrix (DSM)
 - **1. Project Management Tool -** provides a project/organization representation that incorporates feedback and cyclic task dependencies.
 - 2. System Analysis Tool provides a simple 2-d matrix to capture expert judgment for quantifying the dependence between organizational elements.
- Advantages of DSM
 - 1. Easy graphical representation of complex systems.
 - 2. Requires no special tools or algorithms, all modeling can be accomplished on a standard spreadsheet program such as MS Excel.

Source: http://www.dsmweb.org/



Types of System Analysis DSMs

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Component-based DSMs

- 1. Documents interactions between elements in a complex system architecture.
- 2. Types of component interactions (i.e. Spatial, Energy, Information, & Material).

Team-Based DSMs

- 1. Constructed by identifying required communication flows between organizational entities in the matrix.
- 2. Types of information flow among teams (i.e. Level of detail, Frequency, Direction, Timing).

References:

- 1. http://www.dsmweb.org/
- 2. "Framework for Evaluating Architecture, Technology and Organization Options", Tim Brady, NASA JSC. 14-Aug-2003.

DSM Practical Application: Formulation of the Integrated Discipline Teams (IDTs) for Constellation Systems

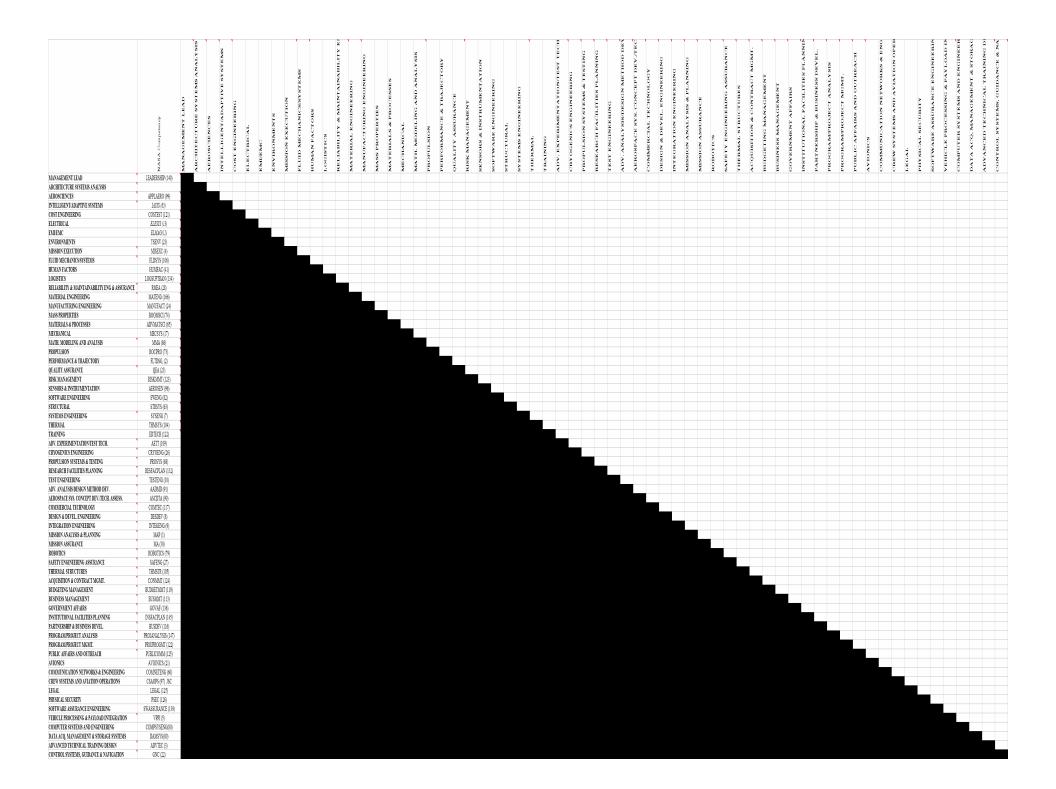


IDT Formulation Study

- Organization Design Objectives:
 - 1. Identify natural groupings of NASA workforce skills / competencies as a basis for team composition.
 - 2. Provide Constellation Systems with a team structure to harness and organize the effort of 190 FTE across the agency.
- Approach: Utilize the DSM to formulate an optimized IDT structure.
- Required Team Members: Two senior civil servants from each NASA center experienced in space system development.
- Study Period: July to September 2004.



- 1. First rule of modeling: If you seek buy-in, the decision makers must be an integral part of the process.
 - a. Briefed all NASA center Points of Contact (POCs) on analysis methodology and requested study team representatives.
 - b. Briefed methodology to team members by Webcast.
- 2. Team members identified the workforce skills required to develop the Constellation Systems.
 - a. Skills Reference: NASA's standard Workforce Competency Dictionary (CMS-DOC-01).
 - b. Skills placed alphabetically into a NxN matrix.





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3. Team members assigned interaction values to Skills Matrix.

- a. Input based on team member's experience and judgment.
- b. All intersections required a value, even if it was a guess.
- c. No rows or columns could be added, deleted, or moved.
- d. Rate the level of interaction between every skill listed:
 - 1. High interaction = 9,
 - 2. Medium interaction = 3,
 - 3. Low interaction = 1,
 - 4. No interaction = 0.

4. A Standard Deviation Matrix was developed next.

- a. Identified the input values that team members disagreed on the most.
- b. A virtual consensus meeting was held to discuss those entries with the highest standard deviations.

	ARCHITECTURE SYSTEMS ANALYSIS ARROSCENCES INTELLIGENTADAPITUE SYSTEMS ARROSCIENCES INTELLIGENTADAPITUE SYSTEMS COST ENGINEERING ELECTRICAL ENGINEERING ENGINEERING ENGINEERING ENGINEERING ENGINEERING HUDMAN FACTORS LOGISTICS HUDMAN FACTORS ANATEMALE ENGINEERING MATHAMOBELING AND ANALYSIS PROPULSION PROPULSION PROPULSION PROPULSION SYSTEMS FINGERING ANATHAMOBELING ANALYSIS PROPULITY & MAINTAINABILITY EI MATHAMOBELING ANALYSIS NATEMALE ENGINEERING THERMAL TRAINING ADV. EXPERIMENTATION SOFTWARE ENGINEERING THERMAL TRAINING ADV. EXPERIMENTATION TEST ENGINEERING THERMAL TRAINING ADV. EXPERIMENTATION SOFTWARE SONGENICS ENGINEERING THERMAL THERMAL TRAINING AND SONGENICS COMMERCIAL TECHNOLOGY DESIGN & DEVEL. ENGINEERING THERMAL STRUCTURES ACQUISITION & CONTRACT MGMT. BUSINESS MANAGEMENT BUSINESS MANAGEMENT BUSINESS MANAGEMENT BUSINESS MANAGEMENT BUSINESS ANANAGEMENT PROGREMENT THERMAL STRUCTURES ACQUISITION ACONTRACT AVIONICS COMMUNICATION NETWORKS & ENG CREWA SYSTEMS AND ENGINEERIN DEGAL TEGAL PROGREMENT TEGAL THERMAL THERMAL THERMAL STRUCTURES COMMUNICATION NETWORKS THERMAL THERMAL STRUCTURES THERMAL STRUCTURES THERMAL THERMAL STRUCTURES AVENCE ANALYSIS PROGREMENT THERMAL THERMAL STRUCTURES AND THERMAL THERMAL THERMAL THERMAL STRUCTURES AND THERMAL T	
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ARCHITECTURE SYSTEMS ANALYSIS	23 12 2 14 1 24 37 1.1 23 34 8 8 18 18 18 18 18 18 18 18 18 18 18 18	3 1.0 1.2
AEROSCIENCES INTELLICENT/ADAPTIVE SVETEMS	12 12 12 13 52 1 26 99 12 33 34 28 30 36 54 26 37 33 09 12 23 14 26 37 26 05 34 29 35 13 09 34 37 12 32 28 26 29 20 29 26 05 05 05 05 03 09 04 30 11 05 14 12 12 03 10 10 29 05 22	9 0.5 3.7
INTELLIGENT/ADAPTIVE SYSTEMS COST ENGINEERING	12 14 1.1 1.4 1.1 1.5 29 32 12 12 29 13 13 28 32 28 29 14 33 37 20 12 34 1.1 29 34 1.1 29 34 1.3 28 15 26 22 25 1.4 3.0 24 37 28 27 29 1.1 1.0 0.5 0.5 0.3 0.5 0.4 1.0 0.9 0.4 28 3.6 3.5 0.3 1.0 3.6 29 3.4 3.2	2 1.0 3.0
ELECTRICAL	14 1 29 27 09 29 32 32 13 33 29 14 14 28 29 23 11 14 12 11 27 12 27 27 28 09 14 12 30 27 09 32 27 10 14 14 35 29 13 12 30 14 14 35 29 13 14 14 27 11 27 12 28 10 14 14 15 14 15 14 15 15 15 15 15 15 15 15 15 15 15 15 15	.7 0.5 3.6
EMI/EMC	3 09 29 12 1 14 26 28 05 34 29 3.7 1.3 05 36 12 38 12 13 26 0.9 0.4 12 13 26 0.9 0.4 12 10 30 12 39 1.4 1.0 1.0 1.1 2.7 1.0 1.2 29 28 1.0 0.5 0.5 0.4 0.3 0.5 0.5 0.4 0.5 0.4 0.5 0.4 3.7 3.7 1.3 0.3 1.0 1.3 1.4 3.2 1.5	.5 0.5 3.4
ENVIRONMENTS	33 37 23 14 27 28 29 27 33 22 37 3 3 0 10 12 33 15 23 28 29 27 33 22 37 33 20 10 12 33 15 33 24 34 12 39 26 13 14 26 12 27 10 28 29 27 29 14 15 34 05 05 04 03 12 03 05 05 04 03 12 03 05 05 04 25 26 28 03 10 05 28 12 23	.8 1.0 3.0
MISSION EXECUTION	12 28 32 3 13 13 13 12 23 37 34 35 26 32 12 27 2.6 27 3.6 37 32 38 13 1.1 15 14 1.4 27 30 35 12 28 37 3.5 28 32 12 38 38 13 1.1 15 14 1.4 27 30 35 12 28 38 35 12 38 35 12 38 38 38 38 38 38 38 38 38 38 38 38 38	.2 3.4 3.8
FLUID MECHANICS/SYSTEMS	12 29 27 24 26 27 26 37 32 38 13 1.1 15 14 14 27 30 35 12 15 37 32 38 13 1.1 15 14 14 27 30 35 12 15 37 27 12 14 10 10 15 13 12 12 26 1.0 05 05 03 29 04 10 09 04 36 15 28 03 1.0 13 14 12 12	.3 1.2 1.2
HUMAN FACTORS	39 38 28 27 12 36 12 34 27 30 28 34 11 28 27 34 27 30 28 34 11 28 27 34 27 30 28 34 11 28 27 34 13 13 13 13 14 14 13 12 34 30 32 32 11 34 29 13 05 29 29 10 29 10 28 29 25 35 20 10 13 07 26 26 23	.8 3.4 2.6
LOGISTICS	34 13 39 30 36 13 10 26 32 10 10 10 10 32 13 29 13 12 13 12 29 30 29 10 34 34 34 28 12 36 10 33 28 10 05 27 10 29 13 04 10 09 16 04 26 09 38 13 24	
RELIABILITY & MAINTAINABILITY ENG & ASSURANCE MATERIAL ENGINEERING		
MANUFACTURING ENGINEERING	24 0.0 23 1.1 26 12 33 12 13 0.4 32 13 2.8 12 13 0.4 32 10 2.8 1.0 3.7 24 3.4 10 2.7 12 12 15 2.6 13 10 0.9 0.9 0.9 0.9 0.9 0.9 0.9 0.9 0.9 0.	
MASS PROPERTIES		
MATERIALS & PROCESSES	3.0 2.7 3.4 3.9 4.0 1.4 1.2 0.9 0.5 3.7 2.7 1.0 0.5 1.2 0.9 1.1 2.8 1.4 1.2 0.9 0.5 3.7 2.7 1.0 0.5 1.2 0.9 1.1 2.8 1.4 1.0 0.7 1.4 1.0 1.0 1.2 1.2 1.0 1.0 1.4 1.2 0.9 0.5 1.2 1.2 1.2 1.3 1.3 1.2 1.0 1.0 1.2 1.3 1.2 1.0 1.0 1.3 1.3 1.2 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	.0 3.0 1.0
MECHANICAL	26 28 14 3.6 27 33 1.1 3.0 26 32 1.0 3.7 32 32 29 3.0 1.1 27 12 32 32 12 27 39 1.3 3.0 1.0 0.5 0.5 0.3 3.0 0.5 1.0 0.9 0.4 1.3 1.2 1.3 0.3 1.0 0.5 3.9 1.0 1.3	.2 1.5 2.8
MATH. MODELING AND ANALYSIS	3.6 3.4 1.2 3.6 1.2 3.2 2.6 3.3 3.7 1.5 3.2 2.7 3.2 1.0 3.8 3.7 3.4 2.9 3.6 2.9 1.0 2.9 2.8 2.9 1.0 1.0 0.4 0.3 1.0 0.5 2.9 1.0 1.0 1.1 2.8 1.4 1.0 1.0 2.9 1.4 3.5 1.0 1.0 2.9 1.4 3.5 1.0 1.0 2.9 1.4 3.5 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	2.9 3.9
PROPULSION	3.1 3.2 3.6 40 1.5 2.8 3.0 3.8 2.9 3.2 3.0 0.0 2.5 3.2 1.1 2.6 2.8 3.4 3.2 3.6 3.6 1.2 3.9 3.7 1.3 1.3 0.5 0.3 1.2 0.5 1.5 1.2 1.0 1.5 1.2 2.9 0.3 1.0 1.2 2.6 1.3 2.5	
PERFORMANCE & TRAJECTORY	0.9 2.6 2.9 3.3 1.3 2.6 3.6 2.8 2.9 1.2 3.6 1.4 1.3 3.2 3.7 1.2 2.3 2.6 2.6 3.4 1.2 2.7 2.8 1.3 1.0 0.4 0.3 1.0 0.3 3.0 2.8 0.4 2.9 2.9 2.7 0.3 1.0 2.9 1.3 1.5 2.2	
QUALITY ASSURANCE RISK MANAGEMENT	29 1.4 1.1 30 1.2 28 3.6 12 3.4 0.9 2.6 12 12 3.0 0.9 3.2 1.5 0.9 3.0 2.7 3.3 1.4 3.7 1.1 3.0 0.9 1.4 1.0 0.5 0.4 2.8 1.0 1.4 2.5 0.4 1.4 1.1 3.6 1.0 2.9 3.4 3.4 1.2 2.5 2.9 1.4 1.1 3.0 1.2 2.8 3.6 1.2 3.4 1.4 3.7 2.6 2.5 12 3.7 3.4 3.2 2.0 1.2 3.0 1.2 3.5 1.4 2.7 2.9 2.9 1.3 3.4 3.4 1.3 1.4 1.2 3.9 1.2 2.9 3.0 2.8 1.3 2.8 1.2 2.9 1.2 3.0 1.2 2.9 1.3 2.9 1.2 2.9 1.2 2.9 1.3 2.9 1.2 2.9 1.2 2.9 1.3 2.9 1.2 2.9 1.2 2.9 1.3 2.9 1.2 2.9 1.2 2.9 1	
SENSORS & INSTRUMENTATION	34 14 23 28 05 25 14 33 12 37 13 11 15 22 26 12 34 23 27 14 10 05 40 31 0 0 13 12 04 12 34	
SOFTWARE ENGINEERING	29 30 13 29 14 09 29 12 35 33 29 27 32 39 32 36 30 15 12 10 29 29 03 10 05 29 28 04 36 38 39 04 13 00 14 20 32	
STRUCTURAL	10 30 05 26 28 32 14 25 12 12 10 30 28 13 27 14 29 37 10 05 04 03 14 04 13 04 04 12 12 15 03 10 04 37 05 14	
SYSTEMS ENGINEERING	10 13 28 26 32 09 32 38 3.7 13 3.7 2.6 38 2.2 2.3 23 12 1.4 12 1.0 1.0 1.0 12 13 2.6 3.0 1.0 3.0 3.4 2.8 0.3 3.0 3.6 3.2 3.2 2.	.7 2.9 3.2
THERMAL	0.5 3.4 3.5 3.6 1.1 1.4 0.7 1.2 1.2 3.3 2.4 2.6 2.7 1.0 1.3 2.7 1.0 0.5 0.4 0.3 1.3 0.4 0.3 1.3 0.9 0.4 2.7 1.4 2.5 0.3 1.0 1.0 1.2 2.8 2.5	
TRAINING	10 12 1.4 13 1.4 29 1.0 10 12 1.2 1.8 1.4 29 1.0 10 12 1.2 2.8 1.4 1.2 2.8 1.3 1.0 0.5 0.5 1.2 1.0 1.3 1.3 1.4 2.9 1.0 1.0 1.0 1.0 1.4 1.0 1.1	
ADV. EXPERIMENTATION/TEST TECH.	35 34 30 34 11 29 29 25 11 12 29 12 14 13 10 05 05 04 29 10 13 05 10 29 13 14 03 30 15 10 27 27 2	
CRYOGENICS ENGINEERING PROPULSION SYSTEMS & TESTING	2.6 29 32 1.1 1.1 29 33 2.3 1.1 1.1 29 3.7 3.8 29 2.7 1.2 3.7 3.8 29 2.7 1.2 2.7 2.5 1.0 0.5 0.4 0.3 1.4 1.0 1.0 0.5 0.4 0.5 1.0 1.0 0.3 1.0 0.4 2.6 0.5 1.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2	
RESEARCH FACILITIES PLANNING	34 1.1 12 30 3.7 29 29 12 09 18 14 29 33 25 29 26 28 2.6 3.7 1.0 12 14 13 13 29 10 30 29 2	
TEST ENGINEERING	28 13 13 36 34 27 37 13 34 12 15 12 05 04 39 05 16 13 04 27 28 29 04 29 27 38 27 2	
ADV. ANALYSIS/DESIGN METHOD DEV.	3.4 29 3.7 3.5 30 1.3 1.3 1.4 1.0 1.0 0.4 0.4 1.0 1.3 2.9 1.2 1.0 2.9 2.9 1.4 0.3 1.0 1.4 2.9 2.7 1.5	
AEROSPACE SYS. CONCEPT DEV./TECH. ASSESS.	2.7 3.7 3.9 3.7 1.2 2.8 2.8 1.4 1.3 1.2 1.3 1.0 1.0 2.9 2.8 2.3 3.0 1.3 1.2 12 1.0 1.0 1.0 3.0 1.4 1.3	
COMMERCIAL TECHNOLOGY	28 29 13 15 37 15 12 1.4 13 29 29 10 10 10 15 29 32 28 13 13 37 30 15 13 27 1.	
DESIGN & DEVEL. ENGINEERING	35 32 33 35 33 26 15 15 10 03 10 13 30 29 10 27 28 34 04 13 12 38 27 27	
INTEGRATION ENGINEERING	34 2 5 2 8 3 3 11 3 0 10 0 5 0 3 2 9 0 5 3 0 3 4 0 4 2 6 12 2 3 0 3 2 9 1 4 3 4 11 1	4 1.3 1.0
MISSION ANALYSIS & PLANNING MISSION ASSURANCE	12 2.0 12 1.4 0.5 2.9 1.2 1.3 0.4 2.8 2.6 2.9 1.2 1.3 0.4 2.8 2.6 2.9 1.2 1.7 0.5 3.9 1.9 1.4 2.8 2.6 2.9 1.2 1.7 0.5 2.9 1.2 1.7 0.9 1.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2	
ROBOTICS	12 1.4 1.0 0.5 40 3.1 10 1.0 1.3 0.9 1.0 1.2 1.4 1.0 1.3 0.9 1.0 1.2 1.4 1.4 0.3 1.0 2.9 1.2 2.7 3.8 1.5 2.9 1.2 2.7 3.8 1.5 2.9 1.2 2.7 3.8 1.5 2.9 1.2 2.8 1.2 2.7 3.8 1.5 2.9 1.2 2.8 1.2 2.9 1.2 2.9 1.2 2.8 1.2 2.9 1.2 2.8 1.2 2.9 1.2 2.8 1.2 2.9 1.2 2.8 1.2 2.9 1.2 2.8 1.2 2.9 1.2 2.8 1.2 2.9 1.2 2.8 1.2 2.9 1.2 2.8 1.2 2.9 1.2 2.8 1.2 2.9 1.2 2.8 1.2 2.9 1.2 2.8 1.2 2.9 1.2 2.8 1.2 2.9 1.2 2.8 1.2 2.9 1.2 2.9 1.2 2.8 1.2 2.9 1.2 2.9 1.2 2.9 1.2 2.9 1.2 2.8 1.2 2.9 1.2 2.9 1.2 2.9 1.2 2.9 1.2 2.8 1.2 2.9 1.2 2.9 1.2 2.8 1.2 2.9 1.2 2.9 1.2 2.8 1.2 2.9 1.2 2.9 1.2 2.9 1.2 2.9 1.2 2.8 1.2 2.9 1.2 2	
SAFETY ENGINEERING ASSURANCE		9 1.2 1.2
THERMAL STRUCTURES	10 05 04 03 12 05 13 09 04 10 1.0 1.0 13 03 10 05 09 05 1	
ACQUISITION & CONTRACT MGMT.	30 00 37 39 35 31 28 05 10 30 32 36 10 30 13 12	.2 0.5 0.5
BUDGETING MANAGEMENT	00 37 35 39 34 27 12 05 10 05 13 29 05 15 10 22	
BUSINESS MANAGEMENT	3.6 3.8 3.7 2.6 7.2 0.4 1.0 0.5 3.9 2.9 0.4 1.0 0.4 3.	
GOVERNMENT AFFAIRS INSTITUTIONAL FACILITIES PLANNING	27 2.8 32 1.6 1.0 1.5 1.5 2.9 3.3 0.4 3.0 1.0 1.0 1.5 1.5 2.9 3.3 0.4 3.0 1.0 1.0 1.5 1.5 2.9 3.3 0.4 3.0 1.0 1.0 1.5 1.5 2.9 3.3 0.4 3.0 1.0 1.0 1.0 1.5 1.5 2.9 3.3 0.4 3.0 1.0 1.1 1.0 1.5 1.5 1.5 2.9 3.3 0.4 3.0 1.0 1.1 1.0 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	
PARTNERSHIP & BUSINESS DEVEL.		.0 1.0 1.0
PROGRAM/PROJECT ANALYSIS	2.0 3.8 1.0 1.0 1.2 2.8 0.9 1.0 1.4 0.9 2.	
PROGRAM/PROJECT MGMT.	32 04 04 1.1 3.5 3.7 0.4 1.1 0.4 1.1	
PUBLIC AFFAIRS AND OUTREACH	0.4 2.9 1.0 2.7 1.5 0.4 2.9 0.4 1.5	
AVIONICS		.3 1.3 3.8
COMMUNICATION NETWORKS & ENGINEERING		
CREW SYSTEMS AND AVIATION OPERATIONS LEGAL		.4 3.8 3.7
PHYSICAL SECURITY	3.2 1.0 1.0 % 1.1	8 0.5 3
SOFTWARE ASSURANCE ENGINEERING	3 3 3 3 2 2 2 2 2 3 3 3 3 3 3 3 3 3 3 3	3 1.5 2.3
VEHICLE PROCESSING & PAYLOAD INTEGRATION		.8 3 1.2
COMPUTER SYSTEMS AND ENGINEERING	2.	.6 2.9 3.2
DATA ACQ, MANAGEMENT & STORAGE SYSTEMS		1.4 2.7
ADVANCED TECHNICAL TRAINING DESIGN		2.9
CONTROL SYSTEMS, GUIDANCE & NAVIGATION		



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5. The Input Averages Matrix was developed next.

- a. Averages of all the inputs were computed and integrated into one chart.
- b. Matrix mirrored diagonally for clustering analysis.
- c. Ranges set:
 - 1. High Interaction = Red
 - 2.Medium Interaction = Yellow
 - 3.Low Interaction = Green

	MANAGEMENT LEAD ARCHITECTURE SYSTEMS ANALYSIS	AEROSCIENCES INTELLIGENT/ADAPTIVE SYSTEMS	COST ENGINEERING ELECTRICAL	EMI/EMC ENVIRONMENTS	2 1	HUMAN FACTORS		MATERIAL ENGINEERING MANUFACTURING ENGINEERING	MASS PROPERTIES	MATERIALS & PROCESSES MECHANICAL		PERFORMANCE & TRAJECTORY	_	KISK MANAGEMENI SENSORS & INSTRUMENTATION	SOFTWARE ENGINEERING		THERMAL	_	CRYOGENICS ENGINEERING		TEST ENGINEERING ADV. ANALYSIS/DESIGN METHOD DEV	AEROSPACE SYS, CONC.		INTEGRATION ENGINEERING MISSION ANALYSIS & PLANNING		ROBOTICS SAFETY ENGINEERING ASSURANCE	THERMAL STRUCTURES ACOUSTION & CONTDACT MCMT	BUDGETING MANAGEMENT	GOVERNMENT AFFAIRS	INSTITUTIONAL FACILITIES PLANNIN PARTNERSHIP & BUSINESS DEVEL.	PROGRAM/PROJECT ANALYSIS PROGRAM/PROJECT MGMT.	PUBLIC AFFAIRS AND OUTREACH	AVIONICS COMMUNICATION NETWORKS & ENG	CREW SYSTEMS AND AVIATION OPER LEGAL	PHYSICAL SECURITY SOFTWARE ASSIBANCE ENGINEERIN	VEHICLE PROCESSING & PAYLOAD IN	COMPUTER SYSTEMS AND ENGINEER DATA ACQ, MANAGEMENT & STORAG ADVANCED TECHNICAL TRAINING D
MANAGEMENT LEAD ARCHITECTURE SYSTEMS ANALYSIS	2.7	2.1 1.6	5.4 1.6	1.2 1.	3 5 1	2 3 2	3.2 5	1.2 1.2	2 1.9	0.8 1	2.7	2.9 2.9	2.8	5.4 1.2	2.7 1	1.8 5.7	1.4 1	.2 2.4		.8 2.8 3	_	3.6 3	3 4.4	4.8 4.3	5 1.0	1.6 4.7 2.7 2.4	1.3	9 8.3	7.7 5.9	4.1 6.2	8.3	9 5.9	1.4 1.2	1.4 4.6	0.6 0	2 3	1.8 1.4 1.7
AEROSCIENCES	2.1 3.8	1.4	1 1	0.8 6.	3.8 7	2.6	1.1 3.4	6.8 2.4	4 3.9	4.3 4.	6 7.7	5.2 6.4	1 3	2.2 3.2	1.6	7.7 5.2	7.7 0	.3 6.8		.2 2.3		6 1	1 3.8	2.3	3 1.7	1.7 2	7.7	3 0.4	0.3 0.1	0.9 0.2	1.4 1	2 0.3	1.9 1	1.8 0.1	0.4 0	4 2	0.7 1.8 0.3
INTELLIGENT/ADAPTIVE SYSTEMS	1.6 2.2	1.4	1.4 1.9	1.2 2.		.2 6.1	2 4.8	1.1 2.2	2 0.9	1.3 2.	3 4.8	2.3 2.2	1.6	3.6 6.6	8.3	2 4.6		.1 5.4	0.9 2	.1 1.1	2.7 3.4	3.3 1	6 3.9	3 4.3	2 1.9	8.1 2.2	1.2	.7 0.4 (0.3 0.1	0.6 0.2	0.6 0	.9 0.2	4.1 4.3	6.1 0.1	0.4 4	.4 2.2	5.4 6.3 1.3
COST ENGINEERING	5.4 8.3	1 1.4	1.2	0.8 1.			3.8 3.8															2 2 1							1.6	3.2 2	5.1	4 0.6	1.1 1.1	1.3 0.8	0.7 1	2 2.3	1.3 1.4 0.7
ELECTRICAL EMI/EMC	1.6 1.2	0.8 1.2	0.8 7.4	7.4 5.	2.2 1 7 0.9 1		1.8 3.2 0.7 2.1																					.3 0.4 (6 43	17 0.1	0.4 1	.4 1.8	3.8 1.4 0.4
ENVIRONMENTS	1.3 3	6.3 2.1	1.9 5.8	7	3.4 4		1.2 2.4																														2.2 2.1 0.8
MISSION EXECUTION	5 6.6	3.8 4	2.6 2.2	0.9 3.		.8 4.1	4.8 3.9	1.3 1.3	3 1.4	1.4 3.	3 4.2	4.7 6.1	2.7	5.7 2	2.8 2	2.7 4.1	3.2 5	7 1.3	0.9 2	.3 1.7	2.3 1.4	3 0	.8 1.8	2.7 8.3	3 7	2.7 4.7		.3 1.4		2.2 1.2	2.2 5	2.1	3.3 4.1	6.7 0.8	3.8 2	8 5.2	3.9 3.7 3.4
FLUID MECHANICS/SYSTEMS HUMAN FACTORS	1.3 1.2	7.7 1.2	0.9 1.6	1.7 4.	3 1.8	1.1	2.2 2.8 4 4.1	3 2.7	7 2.8	2.9	3.8	2.2 2.2	1.2	1.8 2.1	1.6 2	2.6 3.9	6.1	3.9	3 6	2.8	4.2 2.4	2 1	2 2.7	2.7 1.1	3 7 7	1.4 2	2.9	0.4	0.3 0.1	1.7 0.2	0.4 0	9 0.2	3.1 1.1	2.4 0.1	0.4 0	9 1.9	1 1.3 1
HUMAN FACTORS LOGISTICS	1.9 3.2	2.6 6.1	3.8 1.9	0.7 1	2 4.8 2	2 4	4 4.1	1.7	6 1.1 4 4 1.6	3 1	3 2 9	2.2 3.3 1.3 0.7	2.9	3.7 0.8	0.8	0.8 3.7	0.9 1	.7 0.9	0.9 1	.6 1.5	2.1 1.6	2.3 1 5 1.9 0	6 3 3	3.3 5	2.3	1.1 2.7	0.7	.6 2.1	1.3 1.2 1.3 0.4	2.6 0.7	2,1 1	.1 1.4	0.8 0.9	1.3 0.2	2.9 0	9 5.1	1.3 2 1.3
RELIABILITY & MAINTAINABILITY ENG & ASSURANCE	2.2 5	3.4 4.8	3.8 3.2	2.1 2.	4 3.9 2	.8 4.1	6.8	2 3.6	6 1	2.9 3.	8 3.2	4 1.3	5.2	6.3 2.6	2.7	1.3 4.6	1.2	1 1.6	1.1 5	4 1.8	3.7 1.4	1.4 0	8 4.1	3.3 1.	6.7	1.3 5.1	0.9 0	.7 0.4 (0.3 0.2	0.4 0.1			2.1 2.3				2.6 2 1
MATERIAL ENGINEERING	1.2 1.1	6.8 1.1	1.3 1.6	3 4.	1 1.3	3 2.1	6.8 1.7 2	5.4	4 3	9 3.	3 1.6	2.7 1	3.6	1.1 1.3	0.2 4	4.8 1.7	4.1 0	.7 2.9	3 3	.4 0.4	2.8 1.8	1.1 1	4 2.7	1.3 0.5	8 0.9				0.2 0.1	0.7 0.4	0.1 0	4 0.2	0.8 0.7	1 0.2	0.3 0	1 1	0.8 0.3 0.3
MANUFACTURING ENGINEERING	1.2 1.2	2.4 2.2	3.6 1.6	2.7 2.	2 1.3 2	.7 2.6	4 3.6	5.4	2.3	5.4 3.	1 1	2 0.4																.1 1 (0.7 0.1	2.2 1.2	1 2	.1 0.4	2 2.1	2 0.2	0.7 1	7 2.4	1.1 0.8 1.7
MASS PROPERTIES MATERIALS & PROCESSES	1.9 3	4.3 1.3	1.9 1		6 1.4 2 4 1.4 2			3 2.3	3 0		8 3.4 4 1.9 :											2 1.9 0. 1 0.8 3					2.2 0	6 0.4 1	0.2 0.1	0.7 0.1	0.3 0	.7 0.2 8 0.2	0.7 0.6	1.1 0.1	0.3 0	4 1.8	0.8 0.7 0.4
MECHANICAL		4.6 2.3							1 2.8				2.8	2.6 3.6	1.2	7 4.3	4.8 0	.8 4.2	3.8 4	.8 1.7	3.9 2.4	2.4 1	1 4.8	5.7 1.4	2.6	4.1 1.7		.7 0.6	0.3 0.1	1.6 0.3	0.6	1 0.2	1.3 1	1.7 0.1	0.4 0	3 4	0.8 1.1 1.1
MATH. MODELING AND ANALYSIS	2.7 5.7	7.7 4.8	3.2 2.6	2.9	4.2 3	.8 3.3	2.9 3.2	1.6 1	3.4	1.9 2.	7	4.4 6.8	1	3 1.8	3.8 2	2.9 3.4	6 1	.4 3.7	2.6 3	.8 0.8	5.1 6	3.4	2 4.3	2.2 3.9	9 2.2	2.4 2	5.8	.4 0.7 (0.2 0.1	0.7 0.3	1.2 0	.8 0.6	1.2 2.1	1.6 0.3	0.4 2	1 1.6	3.2 3.9 1.7
PROPULSION BEDFORMANCE & TRAJECTORY	2.9 3.9						1.3 4 0.7 1.3			2.4 4.	1 4.4	7.4	3.8	4.4 5	2 4	4.1 5	5.9 1	.9 3.8	7			4.3 2						.9 0.9					2 1	2.2 0.1	0.4 1	.1 3	1.3 2.2 1.1
PERFORMANCE & TRAJECTORY QUALITY ASSURANCE	2.9 6.1	1 1.6								0.9 1.	9 6.8	3.8 0.9	0.9	2.9 2.2	2.4	22 33	09 2	7 1	11	3 1.2		0.9 1				1.1 2.4	0.9 1	.7 0.6 (1.6 1.2		13 4	7 7 3	1.8 1.8 1
RISK MANAGEMENT		2.2 3.6			2 5.7 1	.8 5	3.7 6.3	1.1 3.6	6 1.1	1.8 2.	6 3	4.4 2.9	5	2.2	1.9 1	1.2 7	1.4 2	.3 3	1.4 3	.4 1.9	4.3 2.9	3.1 1	4 4.3	4.7 6.3	3 8.3	1.4	1.4 3	.2 1.9	2.6 2.1	1.8 0.9	4.7 5	4 0.7	1.6 1.1	4.1 1.1	1.4	4 2.3	1.3 1.9 2.4
SENSORS & INSTRUMENTATION	1.4 1.2	3.2 6.6	1	5.9 3.	6 2 2	.1 2.3	08 26	13 16	6 00	1 1 3	6 1 2	5 22	1.2 1	2.2	4.6	10 32	2.3 0	4 3 1	10 3	6 1	42 13	12 1	2 3.4	43 17	4 3 3	3.2 2.4	1.6	.4 0.3	0.2 0.1	0.6 0.3	0.7	1 0.2	4.6 2	4.6 0.1	0.4 2	.5 3	3.8 5.1 1.1
SOFTWARE ENGINEERING	2.7 0.9	1.6 8.3	1.8 2.6	1 1.	2.8 1	.6 4.7	0.8 2.7	0.2 2	2 0.3	1.3 1.	3.8	2 3.7	2.4	1.9 4.6		1.3 3.9	0.9 2	1.9	0.9 2	2 1	3.2 3.6	5 1.8 2	.6 3.8	5 3.4	8 3.1	3.9 1.8	1 0	.8 1.8	1.4 0.1	0.7 0.4	2 1	.7 0.2	5.3 5.1	4.1 0.2	0.7	9 1.9	8.3 6.3 1.7
STRUCTURAL SYSTEMS ENGINEERING	5.7 6.3						0.8 1.3 3.7 4.6																				2 1	2 1 (0.2 0.1	1.2 0.2	2.7	.8 0.2 5 0.6	39 46	4.1 0.1	1.1 2	9 4 8	4.8 2.4 1.8
THERMAL	1.4 1.8	7.7 1.2	1 2.4				0.9 1.2																					.6 0.3									
TRAINING	1.2 0.7	0.3 2.1	1.2 0.8	0.2	5.7	1 6.8	1.7 1	0.7 1.3	3 0.6	0.7 0.	8 1.4	1.9 1.6	2.7	2.3 0.4	2.2	0.4 1.3	0.6	0.8	1 1	.2 0.9	1.2 1.3	0.7 0	.8 1	1 2.4	4 1.6	1 2.3	0.8 0	.6 0.7	0.3 1	0.7 0.8	0.9 1	2 2.1	0.8 0.7	5 0.2	0.8 0	7 1.2	0.8 0.7 8.3
ADV. EXPERIMENTATION/TEST TECH. CRYOGENICS ENGINEERING	2.4 1.2	6.8 5.4	2.9 1.6	1 4.	1 1.3 3	.9 1.7	0.9 1.6 1.1 1.1	2.9 1.8						3 3.1 1.4 1.9			3.4 0	.8	3.1 6	.8 7	6.8 2.1	2.2 1	9 2.8	1.6				.6 0.3 (.6 0.4 (2.2 1.3	1.2 0.1	1.3 1	1 0.6	2.6 2.6 0.9
PROPULSION SYSTEMS & TESTING	1.8 2.3	3.2 2.1	1.8 2.3	1.8 1.				3.4 3.1	3 0.9 1 1.9					3.4 3.6				2 6.8	7.7														0.9 0.6	1.2 0.1	1.3 0	9 2.1	1.1 2.2 0.8
RESEARCH FACILITIES PLANNING	2.8 1.1	2.3 1.1	1.9 1.3	1.15	6 1.7 2	.8 1.3	1.4 1.8	0.4 1.4	4 0.2	0.7 1.	7 0.8	3.1 1.2	0.9	1.9 1	1 1	1.2 1	1.2 0	.9 7	2.2 6	.8	5.4 1.2	1.1 1	6 2.9	2.2 1.3	3 1	0.9 2.4	1.2 2	.1 3.6	3.1 2.1	7.7 2.1	2.9 4	2 0.6	1 1.2	0.9 0.9	2 0	.7 1.3	2.1 2.1 0.8
TEST ENGINEERING	2.2 1.8	2.6 2.7	1.4 4.3	4.1 2.	9 2.3 4	.2 2.1	2 3.7	2.8 2.6	6 1.3	3.1 3.	9 5.1	3.8 1.3	4.8	4.3 4.2	3.2 2	2.8 5 .7	1.9 1	.2 6.8	3.8 6	.8 5.4	2.3	1.3 0	9 5.3	6.8 2.4	4 4.3	1.7 3.4	2.2	.1 1 (0.4 0.2	4.1 0.3	1.3 1	.3 0.2	2.6 2.7	1.9 0.2	1.2 2	.6 2.4	2.6 2.4 0.6
ADV. ANALYSIS/DESIGN METHOD DEV. AEROSPACE SYS. CONCEPT DEV./TECH. ASSESS.	3.1 5.8	6.8 3.4					1.6 1.4 1.9 1.4										2.8 1	.3 2.1	1.2	3 1.2	2.3	7.3 2	1 5.2	3.2 3.9	9 1.7	1.3 1.3	1.6 0	.7 0.6 (.3 1 :	0.2 0.2	0.6 0.8	1.9 1	.4 0.4	1.9 2	1.6 0.1	0.4 1	.6 2	2.6 1.4 0.9
COMMERCIAL TECHNOLOGY	3.3 1.3	1.1 1.6	1.1 0.6	0.6 0.	7 0.8 1	.2 1.1	0.6 0.8	1.4 3.1	1 0.4	3.1 1.	1 2 :	2.3 1	1.8	1.4 1.8	2.6	0.8 1.3	1 0	.8 1.9	1.9	1 1.6	0.9 2.1	2.4	2.1	1.9 0.9				.2 0.9			1.1 1	7 3.8	2.3 1.3	0.9 2.9	1.6	1 0.7	2.6 1.6 1.1
DESIGN & DEVEL. ENGINEERING	4.4 2.8	3.8 3.9	2.3 2.3	2.1 2.	3 1.8 2	.7 3.3	3.3 4.1	2.7 4.6	6 2.4	3.8 4.	8 4.3	4.6 3.2	2.4	4.3 3.4	3.8 3	3.9 5.2	3.6	1 2.8	3.6 4	.2 2.9	5.3 5.2	2 6 <mark>2</mark>	1	6.1 3.1	8 3.4	3.2 3.6	2.9	.1 1.1 (0.7 0.1	0.8 0.9	2	2 0.6	2.6 2.4	3.4 0.2	0.8 1	4 5.1	2.8 2.8 1.2
INTEGRATION ENGINEERING	4.8 3.8	2.3 3	1.9 2.8	2.8	2 2.7 2	.7 3.9	3.3 3.3	1.3 4.1	1 3.7	2.4 5.	2.2	4.8 2.7	3.6	4.7 4.3	5 4	4.1 7.7	3	1 1.6	3.2	2.2	6.8 3.2	4.1 1	9 6.1	3.4	4 3.1	2.1 3.6	2.4	.6 0.8	0.3 0.1	1.7 0.3	2 3	.4 0.2	2.7 2.2	3.2 0.1	1.2 1	6 5.4	2.4 2.1 0.9
MISSION ANALYSIS & PLANNING MISSION ASSURANCE	5.2 1.9	3 4.2 1.7 1.9	5.1 1.1 1.9 1	0.6 2.												2.2 3.4	2./ 2	6 1 7	1.1 2	6 1	4.3 1.3	2 1	3.8	3.1	0.4	1.4 8.3	1.1 0	2 0.7	0.9 1.2 1.7 1.1	0.7 0.2	2.7	7 1.2	1.8 2.2	3.3 1.7	1.4 1	1 4.1	2.4 2.4 2.3 1.9 2.6 1.9
ROBOTICS	1.6 2.7	1.7 8.1	1.1 2.9	2 1.			1.1 1.3							1.4 3.2	3.9	1.9 3.2	1.3	1 1.1	0.7	1 0.9	1.7 1.3	2.3 2	.9 3.2	2.1 3.1	1 1.4	1.4	1.2	.6 0.4	0.2 0.1	0.7 0.7	0.8	1 0.6	2 2.1	1.6 0.1	0.4 2		4.1 3.7 1.3
SAFETY ENGINEERING ASSURANCE	4.7 2.4	2 2.2	1.7 2.2				2.7 5.1			3 1.	2	4 2.4	5	7 2.4	1.8	2 3.2	1.3 2	.3 1.2	1.8 2	.8 2.4	3.4 1.3	2.4	1 3.6	3.6 3.6	6 8.3	1.4	2.3 1	.1 0.4								3.9	2.4 2 1
THERMAL STRUCTURES	1.3 1.1	7.7 1.2	0.8 0.9		7 2.7 2			3.4 2.1														1.6						.6 0.3	0.2 0.1	1 0.3	0.7 0	.9 0.2	8.0 8.0	1.7 0.1	0.4 0	.3 0.9	0.4 1 0.8
ACQUISITION & CONTRACT MGMT. BUDGETING MANAGEMENT	8.3 1.3	0.3 0.7 0.4 0.4					2.1 0.4																					7	9 4.2	3.1 4.1	7.3 8	1 1.1	0.5 0.7	0.4 1.7	1,7 0	.4 1.1	0.8 1.3 0.4
BUSINESS MANAGEMENT	7.7 0.8	0.3 0.3	5.2 0.3	0.2 0.	2 1.2 0	.3 1.3	1.3 0.3	0.2 0.7	7 0.2	0.3 0.	3 0.2 (0.3 0.2	0.3	2.6 0.2	1.4	0.2 0.7	0.2 0	.3 0.3	0.2 0	.4 3.1	0.4 0.2	1.3 2	.3 0.7	0.3 0.9	9 1.7	0.2 0.4	0.2	9 9	4.4	4.3 5.4	6 7	2.4	0.2 0.6	0.3 4.1	1.4 0	2 0.7	0.2 1.1 0.2
GOVERNMENT AFFAIRS	5.9 0.7	0.1 0.1	1.6 0.1	0.1 0.	1 1.4 0	.1 1.2	0.4 0.2	0.1 0.1	1 0.1	0.1 0.	1 0.1 (0.1 0.1	0.2	2.1 0.1	0.1	0.1 0.4	0.1	1 0.2	0.1 0	2 2.1	0.2 0.2	0.6 2	.2 0.1	0.1 1.3	2 1.1	0.1 0.8	0.1	2 4.2	4.4	3.8 5.8	1.6 3	.2 6.3	0.1 0.1	0.1 6.8	1 0	1 0.4	0.1 0.1 0.1
INSTITUTIONAL FACILITIES PLANNING	4.1 0.9	0.9 0.6	3.2 1.2	0.4	1 2.2 1	.7 0.8	2.6 0.4	0.7 2.2	2 0.7	0.9 1.	6 0.7 :	1.1 0.6	1.6	1.8 0.6	0.7 1	1.2 1.1	0.9 0	1.7 2	1.2 2	2 7.7	4.1 0.6	0.7 0	6 0.8	1.7 0.3	7 0.9	0.7 0.9	1	4 3.1	4.3 3.8	2.8	2.3 3	7 1.3	0.6 1.4	1.1 2.1	3.4 0	2 1.7	0.7 0.7 0.6
PARTNERSHIP & BUSINESS DEVEL. PROGRAM/PROJECT ANALYSIS	8.3 1.7	1.4 0.6	5.1 0.4	0.1 0.	3 2.2 0	.4 0.8	2.1 2	0.4 1.2	1 0.3	0.4 0.	6 1.2	1.1 1.4	1.2	4.7 0.7	2 (0.8 2.7	0.7 0	.9 0.9	0.4 0	8 2.9	1.3 1.9	2.7 1	1 2	2 2.3	7 2.3	0.8 1.9	0.3	5 7.3	6 1.6	2.3 2.6	2.0	3 2.6	0.8 0.8	1 2.1	0.9 0	.8 1.2	0.9 2.2 1
PROGRAM/PROJECT MGMT.	9 1.8	1.2 0.9	4 0.9	0.4 0.	6 5.4 0	.9 2.1	1.7 1.4	0.4 2.1	1 0.7	0.8	1 0.8	1.4 1.9	2.8	5.4 1	1.7	0.8 5	0.9 1	.2 0.7	0.7 1	.1 4.2	1.3 1.4	3.2 1	7 2	3.4	4 2.7	1 2.3	0.9	.4 8.1	3.2	3.7 4	8.3	3.7	0.8 0.8	1.2 3.1	2.7 0	8 1.2	0.8 1.3 2
PUBLIC AFFAIRS AND OUTREACH	5.9 0.9	0.3 0.2	0.6 0.2	0.2 0.	2 2.1 0	.2 1.4	0.2 0.3	0.2 0.4	4 0.2	0.2 0.	2 0.6	0.6 0.2	0.2	0.7 0.2	0.2	0.2 0.6	0.2 2	.1 0.6	0.2 0	.6 0.6	0.2 0.4	1.6 3	.8 0.6	0.2 1.3	7 1.2	0.6 0.7	0.2 2	.3 1.1	2.4 6.3	1.3 6.1	2.6 3	.7	0.2 1.2	0.7 2.4	1.4 0	2 1.3	0.2 0.4 0.3
AVIONICS COMMUNICATION NETWORKS & ENGINEERING	1.4 1.1	1.9 4.1	1.1 6.1	6 3.	3.3 3	1 3.1	0.8 2.1	0.8 2	2 0.7	0.8 1.	1 2 1	2 2.2	1.6	1.6 4.6	5.3	1 3.9	2.6 0	7 12	0.3 0	6 12	2.6 1.9	1.3 2	3 2.4	2.7 1	6 2 2	2 1.6	0.8 0	7 0.6	0.2 0.1	0.6 0.4	0.8 0	8 1.2	6.4	4.7 0.1 3.1 0.2	0.4	6 2.2	0.8 3.6 1.3 6 6 1.1
CREW SYSTEMS AND AVIATION OPERATIONS	1.4 1.8	1.8 6.1	1.3 3.1	1.7 4.	1 6.7 2	.4 8.3	1.3 3.1	1 2	2 1.1	1.1 1.	7 1.6	2.2 2.4	3 4	4.1 4.6	4.1	1.8 4.1	3.1	5 1.2	0.7 1	2 0.9	1.9 1.6	1 0	9 3.4	3.2 3.9	9 3.3	1.6 4.3	1.7 1	.4 0.4	0.3 0.1	1.1 0.4	1 1	2 0.7	4.7 3.1	1,1	2	2 5.1	2.1 2.1 5.1
LEGAL	4.6 0.1	0.1 0.1	0.8 0.1	0.1 0.	1 0.8 0	.1 0.6	0.2 0.2	0.2 0.2	2 0.1	0.1 0.	1 0.3	0.1 0.1	0.4	1.1 0.1	0.2	0.1 0.1	0.1 0	.2 0.1	0.1 0	.1 0.9	0.2 0.1	0.6 2	.9 0.2	0.1 0.2	2 1.7	0.1 0.6	0.1	3 1.7	4.1 6.8	2.1 5.1	2.1 3	.1 2.4	0.1 0.2	1.1	3.2 0	4 0.4	0.1 0.3 0.4 0.9 2.2 1 0.8 1.3 2 0.2 0.4 0.3 5.8 3.6 1.3 6 6 1.1 2.1 2.1 5.1 0.2 0.6 0.1
THISICAL SECURIT	2.2 0.6	0.4 0.4	0.7 0.4	0.3 0.	4 3.8 0	.4 0.8	2.9 0.3	0.3 0.7	7 0.3	0.7 0.	4 0.4 (0.4 0.4	1.3	1.4 0.4	0.7	0.4 1.1	0.4 0	.8 1.3	0.6 1	.3 2	1.2 0.4	0.4 1	6 0.8	1.2 1.4	4 1.6	0.4 1.2	0.4	3 1.7	1.4 1	3.4 1.2	0.9 2	.7 1.4	0.4 1.6	2 3.2	1	3 3.1	2.2 2.4 0.3
SOFTWARE ASSURANCE ENGINEERING VEHICLE PROCESSING & PAYLOAD INTEGRATION	2 0.8	2 2 2	2.3 1.9	0.9 0.	5 2.8 0	9 1.2	5.1 3.1	1 24	4 2.7	1.8	4 1.6	1.1 1.9 3 1.2	7.7	4 2.5	1.9	2.9 4.9	0.8 0	2.06	2.7 2	1 13	2.6 1.6	0.8	1 1.4 7 8.1	1.6 1.1	4.1 7 4.1	1.8 3.0	0.3 0	8 1 1	0.2 0.1	1.7 0.3	0.8 0	8 0.2 2 1.3	2.4 2.2	2 0.4 5 1 0.4	3.1 2	2.7	3 21 2
COMPUTER SYSTEMS AND ENGINEERING	1.8 1	0.7 5.4	1.3	3.8 2.	2 3.9	1 2.9	1.3 2.6	0.8 1.1	1 0.8	0.7 0.	8 3.2	1.3 1.8	1.1	1.3 3.8	8.3	0.4 4.8	2.1 0	.8 2.6	0.4 1	.1 2.1	2.6 2.6	1.6 2	6 2.8	2.4 2.4	4 1.9	4.1 2.4	0.4 0	9 0.8	0.2 0.1	0.7 0.1	0.9 0	.8 0.2	5.8 6	2.1 0.2	2.2 6	1 3	0.2 0.6 0.1 2.2 2.4 0.3 6.1 7 1.1 3 2.1 2 7.7 2 7.7 1.2 2 1.2 3.8 2.6 1.9
DATA ACQ, MANAGEMENT & STORAGE SYSTEMS	1.4 1.3	1.8 6.3	1.4 4.3	1.4 2.	1 3.7 1	.3 2.1	2 2	0.3 0.8	8 0.7	0.6 1.	1 3.9	2.2 1.8	2.3	1.9 5.1	6.3	0.7 2.4	1.9 0	.7 2.6	1 2	.2 2.1	2.4 1.4	1.1 1	6 2.8	2.1 2.4	4 2.6	3.7 2	1	1 1.3	1.1 0.1	0.7 0.3	2.2 1	.3 0.4	3.6 6	2.1 0.6	2.4	7 2.1	7.7
ADVANCED TECHNICAL TRAINING DESIGN	1.7 0.6	0.3 1.3	0.7 0.6	0.4 0.	3.4	1 7.3	1.3 1	0.3 1.7	7 0.4	1.4 1.	1 1.7	1.1 1	2.3	2.4 1.1	1.7	0.8 1.8	1.1 8	.3 0.9	0.9 0	8.0 8.	0.6 0.9	1.1 1	.1 1.2	0.9 2.3	3 1.9	1.3 1	0.8	.3 0.4 (0.2 0.1	0.6 0.4	- 1	2 0.3	1.3 1.1	5.1 0.1	0.3 1	1 2	2 1.2



ORGANIZATION DISCIPLINE TEAM

6. Clustering Analysis was then performed.

- a. Highest Interactions (red) clustered around the diagonal.
- b. Team consensus meetings were held to refine the model.
- c. Once consensus was reached, the individual IDTs could then be identified and named.
- d. Analysis results were then presented to Constellation Management and Center POCs.

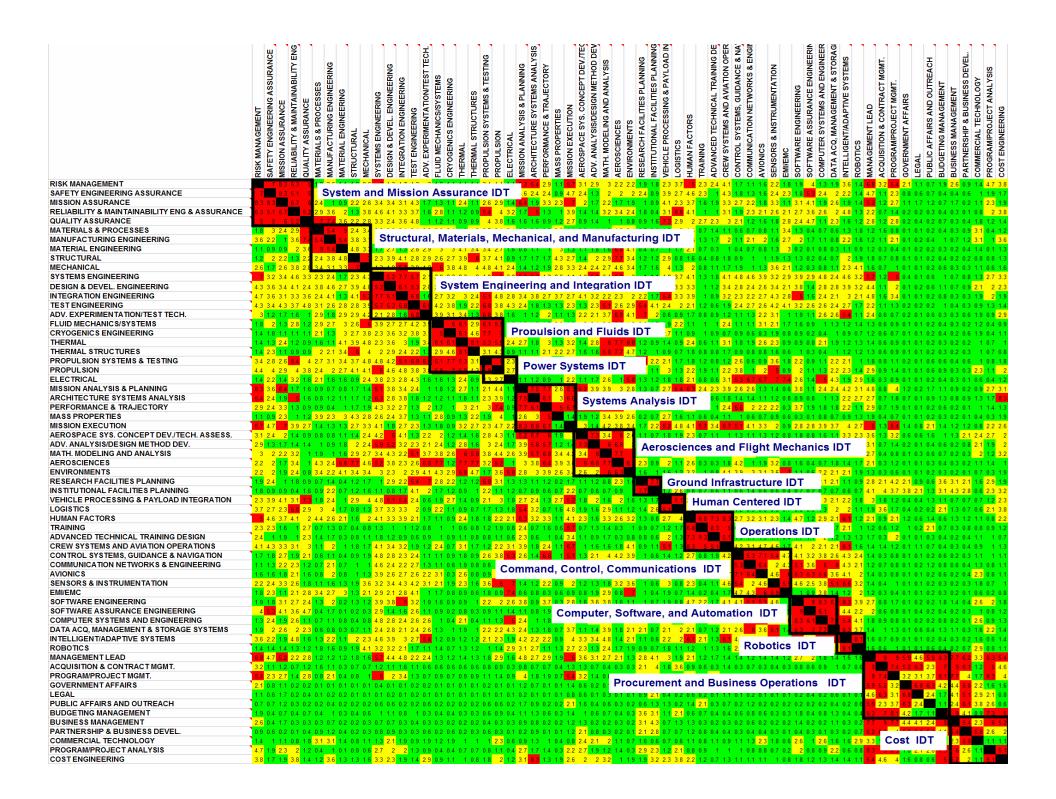
	RISK MANAGEMENT	MISSION ASSURANCE	RELIABILITY & MAINTAINABILITY ENGODALITY ASSURANCE	MATERIALS & PROCESSES	MANUFACTURING ENGINEERING MATERIAL ENGINEERING	STRUCTURAL MECHANICAL	SYSTEMS ENGINEERING	INTEGRATION ENGINEERING	TEST ENGINEERING ADV. EXPERIMENTATION/TEST TECH.	FLUID MECHANICS/SYSTEMS	THERMAL	THERMAL STRUCTURES PROPULISION SYSTEMS & TESTING		ELECTRICAL MISSION ANALYSIS & PLANNING		PERFORMANCE & TRAJECTORY MASS PROPERTIES	MISSION EXECUTION	AEROSPACE SYS. CONCEPT DEV./TEC	MATH. MODELING AND ANALYSIS	AEROSCIENCES ENVIRONMENTS	RESEARCH FACILITIES PLANNING	VEHICLE PROCESSING & PAYLOAD IN	LOGISTICS HUMAN FACTORS	TRAINING ADVANCED TECHNICAL TRAINING DE	CREW SYSTEMS AND AVIATION OPER	SATION NE	AVIONICS SENSORS & INSTRUMENTATION	EMI/EMC SOFTWARE ENGINEERING	SOFTWARE ASSURANCE ENGINEERIN	COMPUTER SYSTEMS AND ENGINEER DATA ACQ, MANAGEMENT & STORAGI	INTELLIGENT/ADAPTIVE SYSTEMS ROBOTICS	MANAGEMENT LEAD	ACQUISITION & CONTRACT MGMT. PROGRAM/PROJECT MGMT.	GOVERNMENT AFFAIRS LEGAL	PUBLIC AFFAIRS AND OUTREACH BUDGETING MANAGEMENT	BUSINESS MANAGEMENT PARTNERSHIP & RISINESS DEVEL	비밀병	COST ENGINEERING
RISK MANAGEMENT		7 8.3	6.3	5 1.8	3.6 1.1	1.2 2.0	6 7 4	.3 4.7	4.3	3 1.8 1	.4 1.4	1.4 3.	4 4.4	1.4 6.	3 5.4	2.9 1.	1 5.7	3.1 2			2 1.9 1			2.3 2.	4 4.1 1	7 1.1	1.6 2.2	1.8 1.	9 4		3.6 1.	4 6.8	3.2 5.4	2.1 1.1	0.7 1.9	2.6 0.		7 3.8
SAFETY ENGINEERING ASSURANCE MISSION ASSURANCE	7	8.3	5.1	5 3	2.2 0.9	2 1.	3.2 3	.6 3.6	3.4 1.2	2 2 1	.8 1.3	2.3 2.	8 4	2.2 3.	6 2.4	2.4 0.	9 4.7	2.4 1	3 2	2 :	2 2.4 0	9 3.9	2.7 4.6 2.3 3.7	2.3	1 4.3 1	8 1.3	1.6 2.4	2.3 1.	5.3	2.4 2	2.2 1.	4 4.7	1.1 2.3	0.8 0.6	0.7 0.4	0.4 0.	6 1 1.9	1.7
RELIABILITY & MAINTAINABILITY ENG & ASSURANCE	6.3 5	.1 6.7	5.7	2.4	3.6 2	1.3 3.5	3.4 3 3 4.6 4	.1 3.3	3.7 1.6	7 1.3 1 6 2.8 1	.1 1.2	0.9 5	4 4	3.2 1.	4 1.9 7 5	1.3	1 3.9	14 1	4 3.2	3.4 2.4	4 1.8 0	4 3.1	2.3 3.7 6.8 4.1	1.6 1.	3.3 2	9 2.3	2.1 2.6	2.1 2.	7 3.6	2.6 2	4.8 1.	3 2.2	0.7 1.4	0.2 0.2	0.3 0.4	0.3 0	1 0.8 2	3.8
QUALITY ASSURANCE	5	5 6	5.2	7	7.4 3.6	2.2 2.	3.3 2	4 3.6	4.8	1 1.2 1	.1 0.9	0.9	4 3.8	1.6 1.	6 1.6	0.9 1.	2 2.7	0.9 1.	4 1	1 0.0	3 0.9 1	.6 7.3	2.9 2	2.7 2.	3 3 2	.1 1.2	1.6 1.8	2.8 2.	4 4.7	1.1 2.3	1.6 1.	2 2.8	1.2 2.8				4 1.8 1.2	
MATERIALS & PROCESSES	1.8	3 2.4	2.9	7																																	9 3.1 0.4	1.2
MANUFACTURING ENGINEERING MATERIAL ENGINEERING	3.6 2	2.2 1	3.6 7.	4 5.4				.6 4.1 : .7 <mark>1.3</mark> :															4 2.6														2 <mark>3.1</mark> 1 4 1.4 0.1	3.6
STRUCTURAL	1.2	2 2.2	1.3 2.	2 2.4	3.8 4.8	4.0 3	2.3 3	9 4.1	2.0 2.3 2.8 2.9	9 2.6 2	.7 3.9	6 3.	7 4.1	0.9 1.	7 1.7	1.7 4.	3 2.7	1.4	2 2.9	7.7 3.4	1 1.2 1	2 2.9	0.8 1.6	0.4 0.	3 1.8 0	.9 1	1 1.9	1.3 1.3	3 0.2	0.6 0.3	2 1.	9 1.8	0.7 0.8	0.1 0.2	0.2 0.3	0.2 0.	2 0.8 0.8	1.3
MECHANICAL	2.6 1	.7 2.6	3.8 2.	8 3.4	3.1 3.3	7	4.3 4	.8 5.7 :	3.9 4.2	2 6 3	.8 4.8	4 4.	8 4.1	2.4 1.	4 1.2	1.9 2.	8 3.3	2.4 2	.4 2.7	4.6 3.4	4 1.7 1	.6 4	1.3 2	0.8 1.	1 1.7 1	.9 1	1.3 3.6	2.1 1.	2 0.3	0.8 1.1	2.3 4.	1 1.6	0.7 1	0.1 0.1	0.2 0.6	0.3 0.	3 1.1 0.6	1.6
SYSTEMS ENGINEERING	7 3	.2 3.4	4.6 3.	3 2.3	2.4 1.7	2.3 4.3	5	.2 7.7	5.7 <mark>2.1</mark>	1 3.9 2	.3 2.3	2 4.	8 5	3.8 5.	1 6.3	4.3 2.	.6 4.1	4.2 5	.9 3.4	5.2	3 1 1	.1 4.8	3.7 4.1	1.3 1.	4.1 4	8 4.6	3.9 3.2	2.9 3.	9 2.9	4.8 2.4	4.6 3.	2 5.7	1.2 5				8 1.3 2.7	
DESIGN & DEVEL. ENGINEERING INTEGRATION ENGINEERING	4.3 3	6 3.4	4.1 2.	4 3.8	4.6 2.7	3.9 4.	5.2	6.1	5.3 2.8	3 2.7 3	.6 3.6	2.9 4.	2 4.6	2.3 3.	8 2.8	3.2 2.	4 1.8	6.5	4.3	3.8 2.3	3 2.9 0	5.1	3.3 3.3	1 1.	3.4 2	.8 2.4	2.6 3.4	2.1 3.	8 1.4	2.8 2.8	3.9 3.	2 4.4	1.1 2	0.1 0.2	0.6 1.1	0.7 0.	9 2.1 2	2.3
TEST ENGINEERING	4.7 3	1.6 3.1	3.3 3.	8 3 1	4.1 1.3 26 28	4.1 5. 28.3	/ /./ 6	3.68	6.8 1.6	2.7 3	8 1 9	2.4 5.	4.8 8 3.8	4.3.2	4 3.8	1.3 1	./ 2./ 3 2.3	4.1 3.	3 5 1	2.3	9 5 4 4	1 2 4	2 2 1	1 0.	3.2 2 5 1 9 2	4 2 7	2.7 4.3	4.1.3	2 2 6	2.4 2.1 26 24	27 1	1 4.8 7 2 2	1.6 3.4	0.1 0.1	0.2 0.8	0.3 0.	3 1.9 2 3 0.9 1.3	1.9
ADV. EXPERIMENTATION/TEST TECH.	3 1	.2 1.7	1.6	1 2.9	1.8 2.9	2.9 4.3	2 2.1 2	.8 1.6	6.8	3.9 3	.1 3.4	1.3 6.	8 3.8	1.6	1 1.2	2 1	.1 1.3	2.2 2	.1 3.7	6.8 4.1	1 7	2 0.6	0.9 1.7	0.8 0.1	9 1.2 1	.1 1.3	2.2 3.1	1.1.	9 1.1	2.6 2.6	5.4 1.	1 2.4	0.6 0.7	0.2 0.1	0.6 0.3	0.3 0.	6 1.9 0.9	2.9
FLUID MECHANICS/SYSTEMS	1.8	2 1.3	2.8 1.	2 2.9	2.7 3	2.6	3.9 2	.7 2.7	4.2 3.9	9	5 6.1	2.9 6.	1 5.9	1.6 1.	8 1.2	1.7 2.	8 1.8	2 2	.4 3.8	7.7 4.3	3 2.8 1	.7 1.9	2.2 1.1	1	1 2.4 1	.1 1.1	3.1 2.1	1.7 1.	6 0.9	1 1.3	1.2 1.	4 1.3	0.6 0.9	0.1 0.1	0.2 0.4	0.3 0	2 1.2 0.4	0.9
CRYOGENICS ENGINEERING	1.4 1	.8 1.1	1.1 1.	1 2.1	1.3 3	2.7 3.1	3 2.3 3	6 3.2	3.8 3.1	1 5 1	6.1	4.6 7.											1.1 0.9								0.9 0.	7 1.2	0.6 0.7	0.1 0.1	0.2 0.4	0.2 0.	6 1.9 0.4	1.1
THERMAL THERMAL STRUCTURES	14 1	3 11	0.9 0	9 1.6	21 34	5.9 4.0	1 22	.6 3 .9 2.4 :	22 13	294	6 8 1	0.1 5.	1 4 3	0.9 1	1 1 1	212	2 2 7	1.4 2	6 5 8	7.7 4	1.2 0 7 1.2	1 0 9	0.9 <mark>2.4</mark> 0.7 1.8	0.6 1.	3.1 1 3 1 7 0	9 0 8	0.8 1.6	0.9 0.	1 0.3	0.4 1	1.2 1.	3 1.4 I 2 1 3 I	16 0.9	0.1 0.1	0.2 0.3	0.2 0.	3 1 0.7	0.8
PROPULSION SYSTEMS & TESTING	3.4 2	.8 2.6	5.4	4 2.7	3.1 3.4	3.7 4.8	3 4.8 4	.2 5.1 (6.8 6.8	8 6.1 7	.7 5.3	3.1	9	2.3 2.	1 2.3	3 1	9 2.3	2.8	3 3.8	3.2 1.	6.8 2	.2 2.1	1.7 1.8	1.2 0.	1.2 2	.6 0.6	0.9 3.6	1.8 2.	2 0.9	1.1 2.2	2.1	1 1.8	0.8 1.1	0.2 0.1	0.6 0.6	0.4 0.	6 1 0.8	1.8
PROPULSION	4.4	4 2.9	4 3.	8 2.4	2 2.7	4.1 4.	1 5 4	.6 4.8	3.8 3.8	5.9	7 5.9	4.3	9	2.7 4.	4 3.9	7.4	4 4.7	4.3 2	.4 4.4	5.2 3.0	3.1 1	.1 3	1.3 2.2	1.9 1.	2.2 3	.8 1	2 5	0.9	2 1.1	1.3 2.2	2.3 1.	4 2.9	0.9 1.4	0.1 0.1	0.6 0.9	0.3 0	3 2.3 1.1	2
ELECTRICAL MISSION ANALYSIS & BLANNING	1.4 2	1.4	3.2 1.	6 2.1	1.6 1.6	0.9 2.4	3.8 2	.3 2.8 4	4.3 1.6	6 1.6 1	3 2.4	0.9 2.	3 2.7	1.	1 1.2	0.9	2.2	1.1 1.	2.6	1 5.	1.3 1	.2 1.8	1.8 2.1	0.8 0.	3.1	.3 6.7	6.7 7	7.4 2.	6 1.4	5 4.3	1.9 2.	9 1.6	0.3 0.9	0.1 0.1	0.2 0.4	0.3 0.	1 0.6 0.4 2 0.9 <mark>2.7</mark>	1.2
MISSION ANALYSIS & PLANNING ARCHITECTURE SYSTEMS ANALYSIS	542	4 19				1.7 1.3		.8 3.8						1.1	5	6.1							3.2 3.2													0.9 0.	9 13 17	8.3
PERFORMANCE & TRAJECTORY	2.9 2	.4 3.3	13.0	9 0 9	04 1	17.19	433	2 27	13 2	2 17	1 3	21	3 7 4	0.9 7	7 6 1		5 6 1	6.5	7 68	64 35	9 12 0	6.13	0733	1.6	24 6	6 2	22 22	0.3 3	7 19	18 18	221	1 2 9	7 19	0101	0.2 0.6	0.2 0	1 1 1.4	1.3
MASS PROPERTIES	1.1 0	.9 2.3	1 1.	2 3.9	2.3 3	4.3 2.1	2.6 2	.4 3.7	1.3 1.1	1 2.8 0	.9 1.3	2.2 1.	9 4	1 2.	6 3	5	1.4	1.9 1.	2 3.4	3.9 2.0	0.2 0	.7 2.7	1.6 1.1	0.6 0.	1.1	1 0.6	0.7 0.9	0.6 0.	3 0.1	0.8 0.7	0.9 1.	3 1.9	0.4 0.7	0.1 0.1	0.2 0.3	0.2 0.	1 0.4 0.3	1.9
MISSION EXECUTION AEROSPACE SYS. CONCEPT DEV./TECH. ASSESS.	3.1.2							.8 2.7 2 6 4.1															4.8 4.1 1.9 2.3														2 0.8 2.2 1 2.4 2.7	2.6
ADV. ANALYSIS/DESIGN METHOD DEV.	29 1	3 17	14 1.	4 1	09 18	22	1 5 9 5	2 32 3	23 21	1 2 4 1	2 28	1.6	3 24	17 3	9 58	5.7 1	2 1 4	7.3	- 6	6.8	2 12 0	6 2	16 16	13.0	162	1 2	19 13	193	6 1 6	26 14	341	3 3 1	7 14	02 01	04 06	020	8 2 1 1 9	2
MATH. MODELING AND ANALYSIS	3	2 2.2	3.2	1 1.9	1 1.6	2.9 2.	7 3.4 4	.3 2.2	5.1 3.7	7 3.8 2	<mark>6</mark> 6	5.8 <mark>3.</mark>	8 4.4	2.6 3.	9 5.7	6.8 3.	4 4.2	3.4	6	7.7	0.8 0	.7 1.6	2.9 3.3	1.4 1.7	7 1.6	4 2.1	1.2 1.8	2.9 3.	8 2.1	3.2 3.9	4.8 2.	4 2.7	0.4 0.8	0.1 0.3	0.6 0.7	0.2 0	3 2 1.2	3.2
AEROSCIENCES ENVIRONMENTS	2.2							8 2.3				7.7 3.								6.3	2.3 0	.9 2	1.1 2.6 1.2 3.2	0.3 0.	3 1.8 4	.2 1	1.9 3.2	0.8 1.	6 0.4	0.7 1.8	1.4 1.	7 2.1	0.3 1.2	0.1 0.1	0.3 0.4	0.3 0.	2 1.1 1.4	1
ENVIRONMENTS RESEARCH FACILITIES PLANNING	19 2							3 2 3																											0.2 0.3	3.1.2	1 1.6 2.9	1.9
INSTITUTIONAL FACILITIES PLANNING	1.8 0	.9 0.9	0.4 1.	6 0.9	2.2 0.7	1.2 1.0	6 1.1 0	.8 1.7	4.1 2	2 1.7 1	.2 0.9	1 2.	2 1.1	1.2 0.	7 0.9	0.6 0.	7 2.2	0.7 0.	.6 0.7	0.9	7.7	1.7	2.6 0.8	0.7 0.	3 1.1 0	6 1.4	0.6 0.6	0.4 0.	7 0.2	0.7 0.7	0.6 0.	7 4.1	4 3.7	3.8 2.1	1.3 3.1	4.3 2	8 0.6 2.3	3.2
VEHICLE PROCESSING & PAYLOAD INTEGRATION																																					7 0.7 1.2	
LOGISTICS HUMAN FACTORS																							4														7 0.6 2.1	3.8
TRAINING								1 1																8.	3 5 0	.8 0.7	0.8 0.4	0.2 2.	2 0.7	0.8 0.7	2.1	1 1.2	0.6 1.2	1 0.2	2.1 0.7	0.3 0	8 0.8 0.9	1.2
ADVANCED TECHNICAL TRAINING DESIGN			1 2.	3 1.4	1.7 0.3	0.8 1.	1 1.8 1	.2 0.9	0.6 0.9	9 10	.9 1.1	0.8 0.	8 1.1	0.6 2.	3 0.6	1 0.	4 3.4	1.1 0.	9 1.7	0.3 0.0	8 0.8 0	.6 2			5.1 1	9 1.1	1.3 1.1	0.4 1.	7 1.1	2 1.2	1.3 1.	3 1.7	0.3 2	0.1 0.1	0.3 0.4	0.2 0.	4 1.1 1	0.7
CREW SYSTEMS AND AVIATION OPERATIONS CONTROL SYSTEMS, GUIDANCE & NAVIGATION	4.1 4	.3 3.3	3.1	3 1.1	2 1	1.8 1.	4.1 3	4 3.2	1.9 1.2	2 2.4 0	3.1	1.7 1.	2 2.2	3.1 3.	9 1.8	2.4 1.	1 6.7	1 1	6 1.6	1.8 4.	0.9 1	.1 5.1	1.3 8.3 1.2 2.7	5 5.	4	.2 3.1	4.7 4.6 7.1 5.4	1.7 4.	1 2	2.1 2.1	6.1 1.	6 1.4	1.4 1.2	0.1 1.1	0.7 0.4	0.3 0.	4 0.9 1	1.3
COMMUNICATION NETWORKS & ENGINEERING	1.7 1	3 22	2.3 1	2 0.5	1.1 0.4 2 1 0.7	1 1	4.6 2	.4 2.2	2.4	1 1.1 0 3 1 1 0	1.9 1.0	0.9 2.	6 1	5.3 2.	6 1.4	2 0	6 4 1	1.3 2.	2 2 1	4.2 3.	3 12 1	4 2 2	0.9 3.2	0.6 1.	3 1 5	3	6.4	4.7 4.	3.6	3.8 Z.6 6 6			0.5 0.6	0.1 0.1	12 0.8	0.2 0.	3 1.1 1 4 13 08	1.1
AVIONICS	1.6 1	.6 1.8	2.1 1.	6 0.8	2 0.8	1 1.	3.9 2	6 2.7	2.6 2.2	2 3.1 0	.3 2.6	0.8 0.	9 2	6.7 1.	3 1.1	2.2 0.	7 3.3	1.3 1.	9 1.2	1.9 3.1	1 10	.6 2.4	0.8 3.1	0.8 1.	4.7 7	.1 6.4	4.6	6 5.	3 5.3	5.8 3.6	4.1	2 1.4	0.3 0.8	0.1 0.1	0.2 0.6	0.2 0	4 2.3 0.8	1.1
SENSORS & INSTRUMENTATION	2.2 2	.4 3.3	2.6 1.	8 1.1	1.6 1.3	1.9 3.0	3.2 3	4 4.3	4.2 3.1	1 2.1 1	.9 2.3	1.6 3.	6 5	7 1.	4 1.2	2.2 0.	9 2	1.2 1.	.3 1.8	3.2 3.	1 0	.6 3	0.8 2.3	0.4 1.	1 4.6 5	. <mark>4</mark> 2								0.1 0.1	0.2 0.3	0.2 0.	3 1.8 0.7	- 1
EMI/EMC SOFTWARE ENGINEERING	1.8 2	8 3 1	2.1 2.	8 3.4 4 13	2.7 3	1.3 2.	3 9 3	.1 2.8	4.1 1 3.2 1.0	1 1.7 U 1 1 6 O	1.8 U.9 19 N.9	1 2	2 2	7.4 U.	8 0.8	3.7 0	3 28	183	6 3 8	16.1	1 10	7 1 9	0.7 1.4	2 2 1	1.7 4 7 4 1 4	1 5 1	5 3 4 6	1	1 0.9	3.8 1.4 8 3 6 3	1.2 8 3 3	9 2 7	1.3 0.4	0.1 0.1	0.2 0.3	1.2 0.	1 0.6 0.2 4 2.6 2	1.8
SOFTWARE ASSURANCE ENGINEERING	4 5	3 4 1	364	7 0 4	1701	02 03	291	4 16	26 11	1 0 9 0	2 08	0.3.0	9 1 1	14 1	1 0 8	19 0	1 28	0.8 1	6 2 1	04 01	3 0 7 0	2 2 7	0912	0.7 1	2 3	2 3 6	53 25	0.9	9	6.1 7	4.4 2.	2 2	0.6 0.8	0.1 0.4	0.2 0.4	0.2 0	3 1 0.8	1.2
COMPUTER SYSTEMS AND ENGINEERING	1.3 2	.4 1.9	2.6 1.	1 0.7	1.1 0.8	0.4 0.8	4.8 2	8 2.4	2.6 2.6	<mark>6</mark> 10	.4 2.1	0.4 1.	1 1.3	5 2.	4 1	1.8 0.	8 3.9	1.6 2	.6 3.2	0.7 2.3	2 2.1 0	.7 3	1.3 2.9	0.8	2 2.1 3	. <mark>8</mark> 6	5.8 3.8	3.8 8.	3 6.1	7.7	5.4 4.	1 1.8	0.9 0.8	0.1 0.2	0.2 0.8	0.2 0.	1 2.6 0.9	1.3
DATA ACQ, MANAGEMENT & STORAGE SYSTEMS INTELLIGENT/ADAPTIVE SYSTEMS	1.9	2 2.6	2 2.	3 0.6	0.8 0.3	0.7 1.1	2.4 2	.8 2.1 :	2.4 2.6	6 1.3	1 1.9	1 2.	2 2.2	4.3 2.	4 1.3	1.8 0.	7 3.7	1.1 1.	4 3.9	1.8 2.	1 2.1 0	2.1	2 2.1	0.7 1.:	2.1 2	.6 6	3.6 5.1	1.4 6.	3 7	7.7	6.3 3.	7 1.4	1 1.3	0.1 0.6	0.4 1.3	1.1 0.	3 1.6 2.2	1.4
ROBOTICS	14 1	4 14	1.3 1	ง เ.ง 2 18	2.2 1.1 16 0.9	19 4	1323	2 2 1	2.7 3.4 1.7 1.1	1.2 0 1 14 0	1.9 1.2	1.2 2.	1 1 4	2.9.3	2 2.2 1 2 7	1.1 1	3 2 7	2.3 1	3 2 4	1.4 2.	9 0 9 0	7 18	1112	1 1	3 16 2	4 2 1	2 3 2	2 3	9 2 2	0.4 0.3 4 1 3 7	8.1	1.6	0.7 0.9	0.1 0.1	0.2 0.4	0.5 0.	3 1.6 2.2 2 1.6 0.6 7 2.9 0.8 2 3.3 8.3	1.4
MANAGEMENT LEAD	6.8 4	.7 5.2	2.2 2.	8 1.2	1.2 1.2	1.8 1.0	5.7 4	4 4.8	2.2 2.4	4 1.3 1	.2 1.4	1.3 1.	8 2.9	1.6 4.	8 2.7	2.9 1.	9 5	3.6 3	.1 2.7	2.1 1.	2.8 4	.1 3	1.9 2.1	1.2 1.	7 1.4 1	4 1.2	1.4 1.4	1.2 2.	7 2	1.8 1.4	1.6 1.	6	9 9	5.9 4.6	5.9 8.3	7.7 6.	2 3.3 8.3	5.4
ACQUISITION & CONTRACT MGMT.	3.2 1	.1 1.2	0.7 1.:	2 1.6	1.1 0.3	0.7 0.1	7 1.2 1	.1 1.6	1.1 0.6	6 0.6 0	.6 0.6	0.6 0.	8 0.9	0.3 0.	8 0.7	0.7 0.	.4 1.3	1.3 0.	.7 0.4	0.3 0.3	2.1	4 1.8	3.6 0.9	0.6 0.1	3 1.4 0	.3 0.7	0.3 0.4	0.3 0.	8 0.6	0.9 1	0.7 0.	6 9	7.4	5.2 6.3	2.3	96	1 1.2 5	4.6
PROGRAM/PROJECT MGMT. GOVERNMENT AFFAIRS	2.1.0	3 2.7	1.4 2.	8 0.8 2 0.4	2.1 0.4	0.8	1 0 4 0	2 3.4	1.3 0.7	7 0.9 0	1.7 0.9	0.9 1.	1 1.4	0.9	4 1.8	1.9 0.	1 4.4	3.2 1.	4 0.8	1.2 0.0	4.2 3	.7 1.2	1.7 2.1	1.2	1.2 0	1 0.4	0.8 1	0.4 1.	7 0.8	0.8 1.3	0.9	1 50	5 2 2 2	3.2 3.1	3.7 8.1	1.7	4 1.7 8.3 8 2.2 1.6	1.0
LEGAL	110	6 1 7	020	4 0 1	02 02	0.1.0	1 0 1 0	2 0 1 1	02 01	1 0 1 0	1 0 1	0.1.0	1 0 1	0.1.0	2 0 1	0.1.0	1 0 8	0.60	1.03	0.1.0	1 0 9 2	1 0 4	0206	020	1 1 1 0	1 0 2	0 1 0 1	0.1.0	2 0 4	0206	0 1 0	1 4 6	8 3 3 1	6.8	24 17	415	2921	0.8
PUBLIC AFFAIRS AND OUTREACH	0.7.0	7 12	0.3.0	2 0 2	04 02	02.03	06.0	6.02	02.06	6 0 2 0	2 02	020	6 0 6	0.2 1	7 0 9	020	2 2 1	16.0	4 0 6	03.03	2 0 6 1	3 1 3	02 14	2 1 0	3 0 7 0	2 1 2	02 02	0.2.0	2 0 2	02 04	020	6 5 9	23 37	63 24	1.1	24 6	3826	0.6
BUDGETING MANAGEMENT	1.9 0	.4 0.7	0.4 0.	7 0.4	1 0.3	0.4 0.0	3 1 1	.1 0.8	1 0.3	3 0.4 0	.4 0.3	0.3 0.	6 0.9	0.4 1.	1 1.3	0.6 0.	3 1.4	1 0	6 0.7	0.4 0.3	3.6 3	.1 1.1	2.1 0.6	0.7 0.	4 0.4 0	6 0.8	0.6 0.3	0.3 1.	8 0.4	0.8 1.3	0.4 0.	4 8.3	7 8.1	4.2 1.7	1.1	9 4.	1 0.9 7.3	3 5
BUSINESS MANAGEMENT PARTNERSHIP & BUSINESS DEVEL.	2.6 0	4 1.7	0.3 0.	3 0.3	0.7 0.2 1.2 0.4	0.2 0.3	3 0.7 0	9.03	0.4 0.3	3 0.3 0 3 0.2 0	0.2	0.2 0.	4 0.3 6 0.3	0.3 0.	9 0.8	0.2 0.	2 1.2	1.3 0.	2 0.2	0.3 0.3	3.1 4	.3 0.7	1.3 1.3	0.3 O.:	2 0.3 0 1 0 4 0	2 0.6	0.2 0.2	0.2 1.	4 0.2	0.2 1.1	0.3 0.	7 62	9 7.7	4.4 4.1 5.8 5.1	6.1 4.1	5.4	4 2.3 6	5.2
COMMERCIAL TECHNOLOGY	1.4	1 1.1	0.8 1.	8 3.1	3.1 1.4	0.8 1.	1 1.3 2	1 1.9	0.9 1.9	9 1.2 1	.9 1	1	1 2.3	0.6 0.	9 1.3	1 0	4 0.8	2.4 2	.1 2	1.1 0.	7 1.6 0	.6 0.7	0.6 1.1	0.8 1.	1 0.9 1	.1 1.3	2.3 1.8	0.6 2.	6 1	2.6 1.6	1.6 2.	9 3.3	1.2 1.7	2.2 2.9	3.8 0.9	2.3 5	5.8 2.6 8 1.1 6 1.1	1.1
PROGRAM/PROJECT ANALYSIS	4.7 1	.9 2.3	2 1.	2 0.4	1 0.1	0.8 0.0	2.7	2 2	1.3 0.9	9 0.4 0	.4 0.7	0.7 0.	8 1.1	0.4 2.	7 1.7	1.4 0.	3 2.2	2.7 1	.9 1.2	1.4 0.:	2.9 2	1.2	2.1 0.8	0.9	1 1	1 0.8	0.8 0.7	0.2	2 0.8	0.9 2.2	0.6 0.	8.8	5 8.3	1.6 2.1	2.6 7.3	6 2	6 1.1	5.1
COST ENGINEERING	3.8 1	.7 1.9	3.8 1.	4 1.2	3.6 1.3	1.3 1.0	3.3 2	.3 1.9	1.4 2.9	9 0.9 1	.1 1	0.8 1.	8 2	1.2 3.	1 8.3	1.3 1.	9 2.6	2	2 3.2	1 1.	1.9 3	.2 2.3	3.8 2.2	1.2 0.	7 1.3 1	.1 1.1	1.1 1	0.8 1.	8 1.2	1.3 1.4	1.4 1.	5.4	4.6 4	1.6 0.8	0.6	5.2	<mark>2 1.1 5.1</mark>	



ORGANIZATION DISCIPLINE TEAM

6. Clustering Analysis

- a. Highest Interactions (red) clustered around the diagonal.
- b. Team consensus meetings were held to refine the model.
- c. Once consensus was reached, the individual IDTs could be identified and named.
- d. Analysis results were then presented to Constellation Management and Center POCs.





IDT Formulation Conclusion: Success!

- Constellation management implemented the recommended IDT formulation.
 - Because of team representation, buy-in from Centers was immediate.
 - Management appreciated that the entire process was traceable.
- ODT requested to perform additional DSM Analyses.
 - Langley Research Center reorganization application to determine which branches should be collocated across directorates.